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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,748	02/10/2004	Klaus Goller	1890-0054	8728

7590 08/25/2006  
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EXAMINER

KALAM, ABUL

ART UNIT PAPER NUMBER

2814

DATE MAILED: 08/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/775,748	Applicant(s) GOLLER ET AL.	
	Examiner Abul Kalam	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 August 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 12-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Status of Application***

1. Applicants Request for Continued Examination filed on August 7, 2006 is acknowledged. Claims 1-11 were previously cancelled, and thus claims 12-20 remain pending in the application.

### ***Claim Objections***

2. **Claims 12-20** are objected to because they contain the following informalities:

In line 2 of claim 12, applicant claims "a first terminal surface," but does not claim a first terminal. This appears to be an inadvertent amendment to the claim, in which the phrase "a first terminal having," was deleted from the claim, which was presented in Applicant's Amendments to the Claims on February 17, 2006. Because of this deletion, the claimed "first terminal," in claims 12-15, lacks antecedent basis. Claims 13-20 depend from claim 12 and thus also contain the same issue.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 12, 14-17 and 19-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Pasch et al. (US 6,239,491; as cited in the previous Office Action)** in view of **Shields et al. (US 6,087,724)**.

With respect to **claim 12**, **Catabay** teaches (**FIG. 3**) an arrangement for contacting terminals of a substrate (**2**) comprising:

a substrate surface, a first terminal (**10**) surface, and a second terminal (**14**) having a second terminal surface, the first terminal surface being located at a shorter distance from the substrate surface than the second terminal surface (**FIG. 3**), the arrangement comprising:

a first insulating layer (**130**) on the substrate surface, having an insulation-layer surface being located at a longer distance from the substrate (**2**) surface than the second terminal (**14**) surface, wherein a part of said first insulating layer is arranged between the first and the second terminal (*As best interpreted by the Office*) (**FIG. 3**).

a second insulating layer (**150**) arranged on the first insulting layer (**130**) (**FIG. 3**); wherein the first insulating layer (**130**) has a contact via (**132**) which extends from the insulation-layer surface to the first terminal (**10**) surface and is filled with a first conductive material ("**tungsten**") (**FIG. 3**; col. 7, Ins. 42-46);

wherein the second insulating layer (**150**) has a first recess (**152**), the first recess penetrating the second insulating layer and extending to the first conductive material (**FIG. 3**) (**FIG. 3**; col. 7, Ins. 55-67); and

wherein a second recess (**134, 154**) extends to the second terminal surface (**14**) through the first and second insulating layers (**130, 150**), and is filled with a third conductive material (**FIG. 3**; col. 7, Ins. 42-67).

Thus, **Pasch** teaches all the limitations of the claim, as set forth above, with the exception of disclosing: wherein the first recess extends into the first insulating layer

and is filled with a second conductive material, such that the second conductive material contacts the first conductive material on a top surface and on a portion of a side surface thereof.

However, **Shields** teaches (**FIG. 7**) an arrangement for contacting terminals on a substrate wherein a first recess (**62**), penetrating the second insulating layer (**65**) and extending to the first conductive material (**61A**) and into the first insulating layer (**63**), is filled with a second conductive material (**66**; **col. 6, Ins. 55-59**), such that the second conductive material contacts the first conductive material (**61A**) on a top surface (**161A**) and on a portion of a side surface (**261A**) thereof (**col. 6, Ins. 15-65**). Shield's invention is applicable to the production of various types of semiconductor devices, which exhibit high speed characteristics and improved reliability (**col. 7, Ins. 26-38**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to modify the structure of **Pasch** with the teaching of **Shields**, for the well known purpose of forming low resistance vias, which improves the reliability and performance of interconnection structures in semiconductor devices.

With respect to **claim 14**, **Pasch and Shields** teach the arrangement of claim 12, as set forth above. Furthermore, **Pasch** teaches wherein the first terminal (**10**) (*As best interpreted by the Office*) is one of a source terminal and a drain terminal, and the second terminal is a gate terminal (**14**) of a field-effect transistor (**col. 7, Ins. 30-33**).

With respect to **claim 15**, **Pasch and Shields** teach the arrangement of claim 12, as set forth above. Furthermore, **Pasch** teaches wherein the first terminal (**10**) (*As*

*best interpreted by the Office*) is one of a source terminal and a drain terminal of a field-effect transistor (**col. 7, Ins. 30-33**).

With respect to **claim 16, Pasch and Shields** teach the arrangement of claim 12, as set forth above. Furthermore, **Pasch** teaches wherein at least one of the first conductive material, the second conductive material and the third conductive material comprises metal (“**tungsten**”) (**col. 7, Ins. 42-67**).

With respect to **claim 17, Pasch and Shields** teach the arrangement of claim 12, as set forth above. Furthermore, **Pasch** teaches wherein the first conductive material comprises tungsten (**col. 7, Ins. 42-46**).

With respect to **claim 19, Pasch and Shields** teach the arrangement of claim 12, as set forth above. Furthermore, **Pasch** teaches (**FIG. 3**) wherein the second conductive material is conductively connected (**via 152**) to first conductive material and forms a first contact terminal, and wherein the third conductive material is conductively connected (**vias 154, 134**) to the second terminal (**14**) and forms a second contact terminal (**col. 7, Ins. 42-67**).

With respect to **claim 20, Pasch and Shields** teach the arrangement of claim 12, as set forth above. Furthermore, **Pasch** teaches wherein the first contact terminal and second contact terminal form a wiring plane (**FIG. 3; col. 7, Ins. 42-67**).

4. **Claims 13 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Pasch et al. ('491; cited in the previous Office Action)** and **Shields et al. (US**

'724; cited above), as applied to claim 12 above, and further in view of **Broekaart et al. (US 2001/0046784)**.

With respect to **claim 13, Pasch and Shields** teaches all the limitations of the claim, as set forth above in claim 12, with the exception of disclosing:

The first terminal is one of a base terminal and a collector terminal, and the second terminal is an emitter terminal, arranged on a stack, of a bipolar transistor.

However, **Broekaart** teaches (**FIG. 1**) an arrangement for contacting terminals (**3, 4, 5**) of a substrate (**1**), wherein the first terminal (*As best interpreted by the Office*) is one of a base terminal and the second terminal is an emitter terminal, arranged on a stack, of a bipolar transistor (**pg. 1, [0015]**).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the structure of **Pasch and Shields** with the teaching of **Broekaart**, because applying an interconnection structure to semiconductor devices such as MOSFET's or bipolar transistors would have been considered a mere substitution (**pg. 1, [0015]**) of art recognized equivalent devices (MPEP 2144.06).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Lindle Air Products Co.* 85 USPQ 328 (USSC 1950).

With respect to **claim 18, Pasch and Shields** teaches all the limitations of the claim, as set forth above in claim 12, with the exception of disclosing:

wherein at least one of the second and third conductive materials is copper.

However, **Broekaart** teaches (**FIG. 1**) an arrangement for contacting terminals (**3, 4, 5**) of a substrate (**1**), wherein the second conductive material (**18**) comprises copper (**pg. 3, [0024]**).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the structure of **Pasch and Shields** with the teaching of **Broekaart**, because substitution of art recognized equivalent materials, such as copper and tungsten (**pg. 3, [0024]**), which are well known conductive materials used to fill vias, would have been obvious to one of ordinary skill in the art of semiconductor devices (MPEP 2144.06).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Lindle Air Products Co.* 85 USPQ 328 (USSC 1950).

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 12-20 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.




Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is 571-272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Abul Kalam  
Examiner  
Art Unit 2814

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